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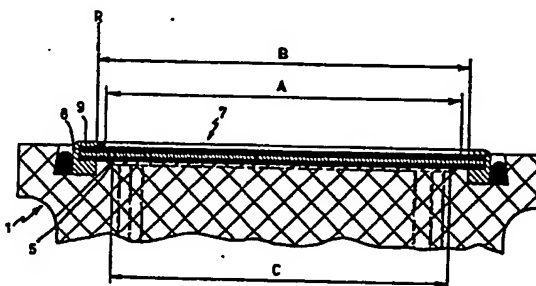
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64 Designated Contracting States: **DE FR GB IT NL**

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54 Filter screen for a high pressure separating press.

57 A filter which is particularly designed for use in a high pressure separating press, e.g. a cocoa press, having screen components (7) which are positioned in a metal ring (8) which is provided with a flange (9), the diameter (A) of which flange differs from the inner diameter (B) of the ring by about half the difference between the diameter (C) of the pitch circle of the outer groove of the press plates and the inner diameter (B) of the ring, has a considerable longer useful life than known filters of this kind.



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The present invention relates to a filter screen, particularly destined for use in a high pressure separating press, e.g. a cocoa press, in which one or more layers of filtering material are placed in the front-face of a press platen provided with circular grooves, which filter screen is fixed to said front face by fastening means, e.g. a cord pressed around the filter screen into a circular recess with a trapezoidal cross-section.

The known filter screen consists of plates of twilled gauze, made from steel wire, preferably chromium-nickel steel wire. The mounting of these known gauze plates in the front-face of a press platen of a separating press is an action requiring craftsmanship, because the outer rim of the gauze plate is to be bent through 90° and thereupon to be fixed by pressing a fastening means, e.g. a cord in the circular recess with trapezoidal cross-section. It is unavoidable that the weft threads loosen, notably in the zone where the warp threads are in radial or virtually radial direction. This results in weak places of the gauze plates, where in spite of skilled and precise mounting not infrequently further damage, e.g. breakage of wires occurs. The warp threads of such gauze plates have a diameter between about 0.3 and 0.35 mm and the weft threads have a diameter of about 0.2 mm.

During the operation of the separating press such high pressures are used, however, that in the weak places of the gauze plates breakage or further breakage of wires may occur. If this happens in the case of a cocoa press or other press for fatty food or feed material this may give rise to pieces of wires getting into the press cake, resulting in damage to mills or customers' complaints.

The occurrence of broken wires, and also of excessive deformation, is checked by regular inspection of the gauze plates. Once a wire is broken somewhere along its length, the protruding end can become trapped in the press cake and consequently be broken off when the press cake is removed. As soon as this is found to occur the filter screen must be replaced. The time during which the filter screen serves is called the useful life.

It is an object of the invention to reduce the above problems considerably and to provide a filter screen which has a considerably longer useful life than the known filter screen. Furthermore the filter screen must be applicable without expensive adaptation of existing separating presses.

According to the invention this is achieved by framing the layer or layers of filtering material in a metal ring provided with a peripheral flange, the inner diameter of which differs from the inner diameter of the ring by a value

essentially half the difference between the diameter of the pitch circle of the outer groove and the inner diameter of the ring.

Preferably the diameter of the peripheral flange is smaller than the inner diameter of the ring.

In the case of a cocoa press or a similar press an additional feature applies, notably that in the filter screen one or more supporting screens are included, with on top of them a woven gauze press mat, the lower surface of the lower supporting screen being at essentially half the total height of the thickness of the ring plus the flange.

It has appeared from experiments that wire breakage no longer occurs, and that the useful life of the filter screens has become considerably longer on average. The only adaptation of existing cocoa presses required consists of the widening and deepening of the circular recess with trapezoidal cross-section.

The invention will be further explained below with the help of the drawings.

Fig. 1 shows as an example a cross section of a press platen of a cocoa press with a filter screen mounted in it,

Fig. 2 is an enlarged sectional view of the left hand part of fig. 1, showing a first embodiment of the framing of a filter packet in the ring and the fastening of a complete filter screen on the press platen by means of an elastic cord,

Fig. 3 is a view as in fig. 2, but showing a second embodiment, and

Fig. 4 shows a third embodiment.

In the cross-section of a press platen 1 of a (not shown) cocoa press which is adapted to receive a filter screen 7 according to the invention, characters

A, B and C are used to indicate the following diameters:

A = the inner diameter of a peripheral flange 9 of a metal ring 8;

B = the inner diameter of the ring 8, and

C = the pitch circle of the outer groove 5 of a press platen 1.

The press platen 1 shown in more detail in Fig. 2 has a front-face 2 in which a circular recess 3 with trapezoidal cross-section has been made. A reversed curved surface 4 of the press platen 1 together with a packing consisting of a

felt ring (not shown) is to provide the seal between the press chamber of the cocoa press and the atmosphere.

The press platen 1 has furthermore in a well-known fashion a number of circular grooves 5 with e.g. a triangular cross-section, each of which is connected with a number of bores 6. The grooves 5 and the bores 6 are a part of the route which the cocoa butter follows in a cocoa press. The so-called cocoa cake then remains above the front face 2, partially in the recess 3 and against a filter screen 7.

The filter screen 7 consists of a metal ring 8 with peripheral flange 9, in which is framed a filter packet, consisting from top to bottom in fig. 2 of a woven gauze press mat 10, a first supporting screen 11 with a larger size of mesh than the press mat, e.g. about 0.75 mm, and a second supporting screen 12 with a still larger size of mesh, e.g. about 1 mm. As a matter of fact within the spirit of the invention one of the supporting screens or both may be (a) perforated-plate screen(s).

The flange 9 protrudes from the ring 8 in an axial direction before the filter packet is received in the ring.

The special feature of flange 9 is that in the completed shape of the filter screen, it has an inner diameter A which differs from the inner diameter B of the ring 8, and that it is preferably smaller. It is presumed that the longer useful life of the filter screen of the invention is among other things, achieved by the favourable distribution and transmission of forces, as a result of the fact that the projection P of the inner diameter A of the flange 9 specifically does not coincide with the parallel tangents R between the curvatures of the ring 8 and the press platen 1.

Further, for cocoa and similar presses the locking of the ring 8 in the recess 3 is of importance. This can be achieved by means of a cord 13 made of Teflon or similar elastic material.

In an attempt to explain the considerably longer useful life which is provided by the invention one could suppose that the cord 13 exerts such a high strain in a radial inward direction on the ring 8 that the flange 9 as it were tends to bend upward; or in any case to offer an increased resistance to the pressure in the press chamber of a cocoa press. Generally speaking that pressure in a cocoa press becomes so extreme, that only a few operations are sufficient for an originally almost-smooth press mat 10 to acquire a clear concentric pattern corresponding with the pattern of the grooves 5 in the press platen 1.

One could also think of a lever effect which counteracts tilting in an inward direction, whereby the pressure of the inner edge of the flange on the press mat is reduced.

The preference given in the invention in the case of a cocoa or similar press for the embodiment in which the inner diameter A of the flange 9 is smaller than the inner diameter B of the ring 8 results from the fact, that in that embodiment little or no deformation of the press mat 10 occurs in the region of the projection of the parallel tangents R of the curvatures on the upper surface of the press mat 10. This prevails over the higher throughput of the embodiment in which the inner diameter A of the flange 9 is larger than the inner diameter B of the ring 8.

It is also possible to describe the invention by prescribing that the inner diameter A of flange 9 has to be outside the area of the angle  $2\alpha$  defined by the fictitious connection lines V (fig. 2) between the touching point of the curvatures of the press platen 1 and the ring 8 on the one hand and the inner diameter A of the flange 9 on the other, the angle  $\alpha$  being at least  $15^\circ$ .

Other embodiments than shown in the drawing are also within the scope of the claims. Notably the variant shown in Fig. 3 can be considered, in which a peripheral flange 14 extends outward below the cord 13. It is also possible to replace the cord 13 by a helically wound metal spring 15 which can be snapped into the circular recess 3 with trapezoidal cross-section. In the latter case the circumferential surface of the ring 8 is preferably provided with a notch 16 to position the spring.

CLAIMS

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1. Filter screen, particularly destined for use in a high pressure separating press, e.g. a cocoa press, in which one or more layers (10, 11, 12) of filtering material are placed in the front-face of a press platen (1) with circular grooves (5), which filter screen is fixed to said front-face by fastening means (13) e.g. a cord pressed around the filter screen into a circular recess (3) with a trapezoidal cross-section, characterized in that the layer or layers (10, 11, 12) of filtering material are framed in a metal ring (8) provided with a peripheral flange (9) the inner diameter (A) of which differs from the inner diameter (B) of the ring by a value essentially half the difference between the diameter of the pitch circle (C) of the outer groove (5) and the inner diameter (B) of the ring (8).
2. Filter screen as in claim 1, characterized in that the inner diameter (A) of the peripheral flange (9) is smaller than the inner diameter (B) of the ring (8).
3. Filter screen as in the claims 1 or 2, characterized in that in the filter screen two supporting screens (11, 12) are included, with on top of them a woven gauze press mat (10), the lower surface of the lower supporting screen (12) being at essentially half the total height of the thickness of the ring (8) plus the flange (9).
4. Filter screen as in claim 3, characterized in that a fictitious connecting line (V) between the touching point of the curvatures of the press platen (1) and the ring (8) on the one hand and the inner diameter of the flange (9) on the other hand forms an angle ( $\alpha$ ) of at least  $15^\circ$  with the lengthwise centerline of the filter screen.
5. Filter screen as in any one of the claims 1-4, characterized in that the ring (8) is provided with a peripheral flange (14), extending in outward direction and situated in the mounted state of the filter screen below the fastening means (13).
6. Filter screen as in any of the claims 1-5, characterized in that the fastening means (13) is a cord.
7. Filter screen as in any of the claims 1-5, characterized in that the fastening means (13) is a helically wound metal spring.
8. Filter screen as shown in the drawings and/or explained with the help thereof.

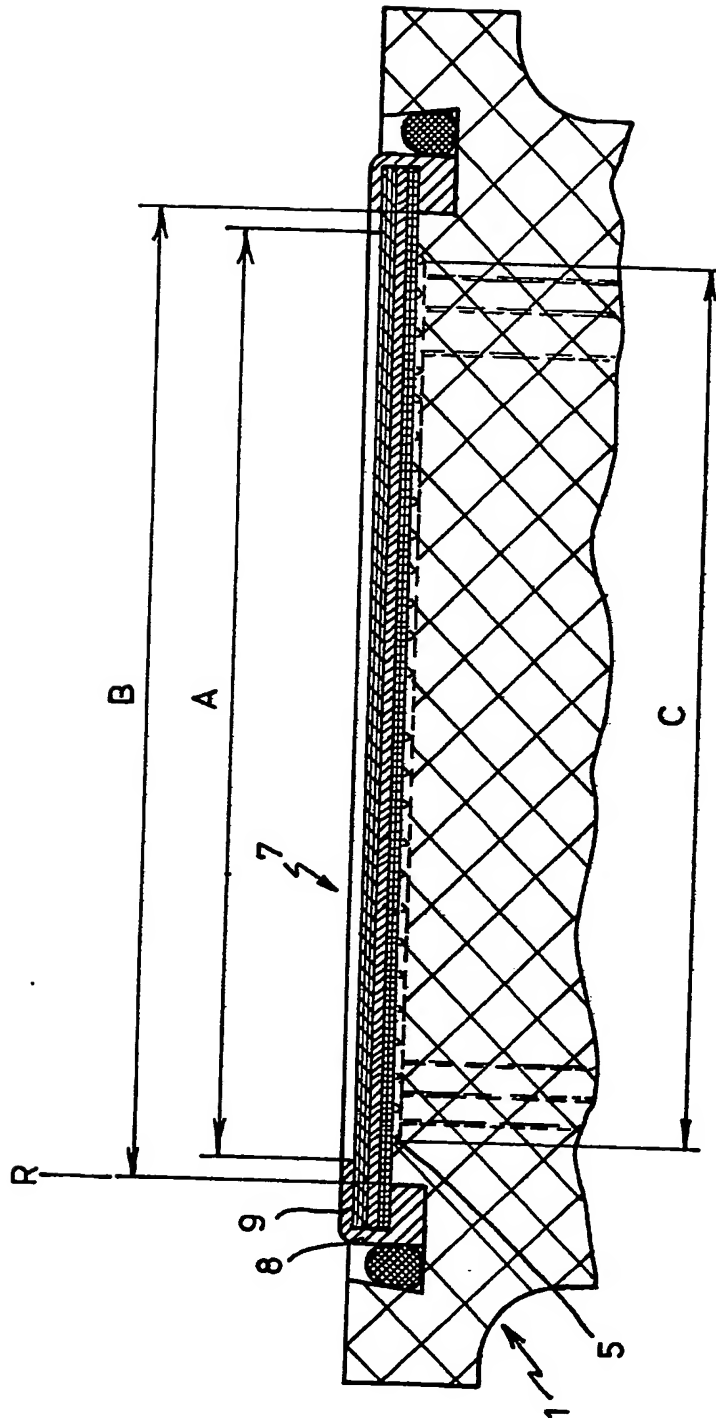
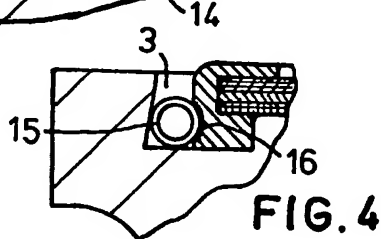
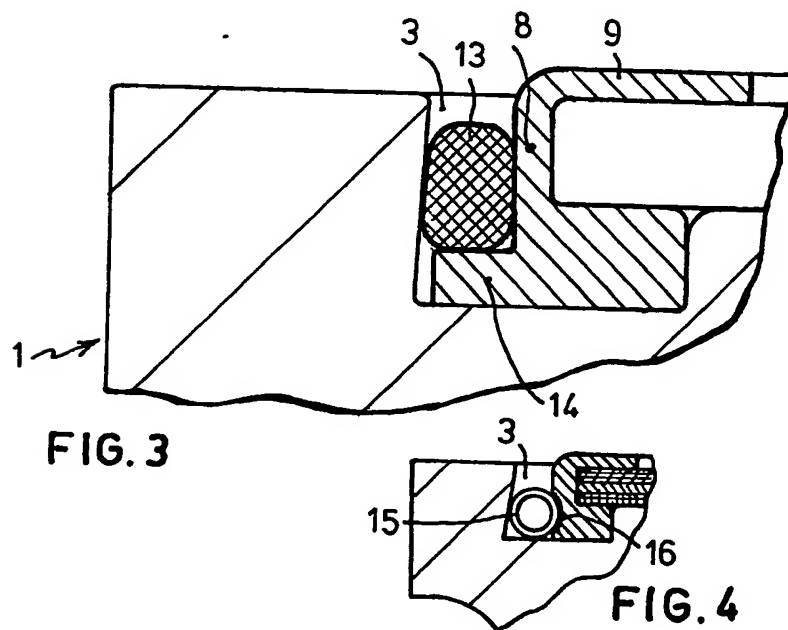
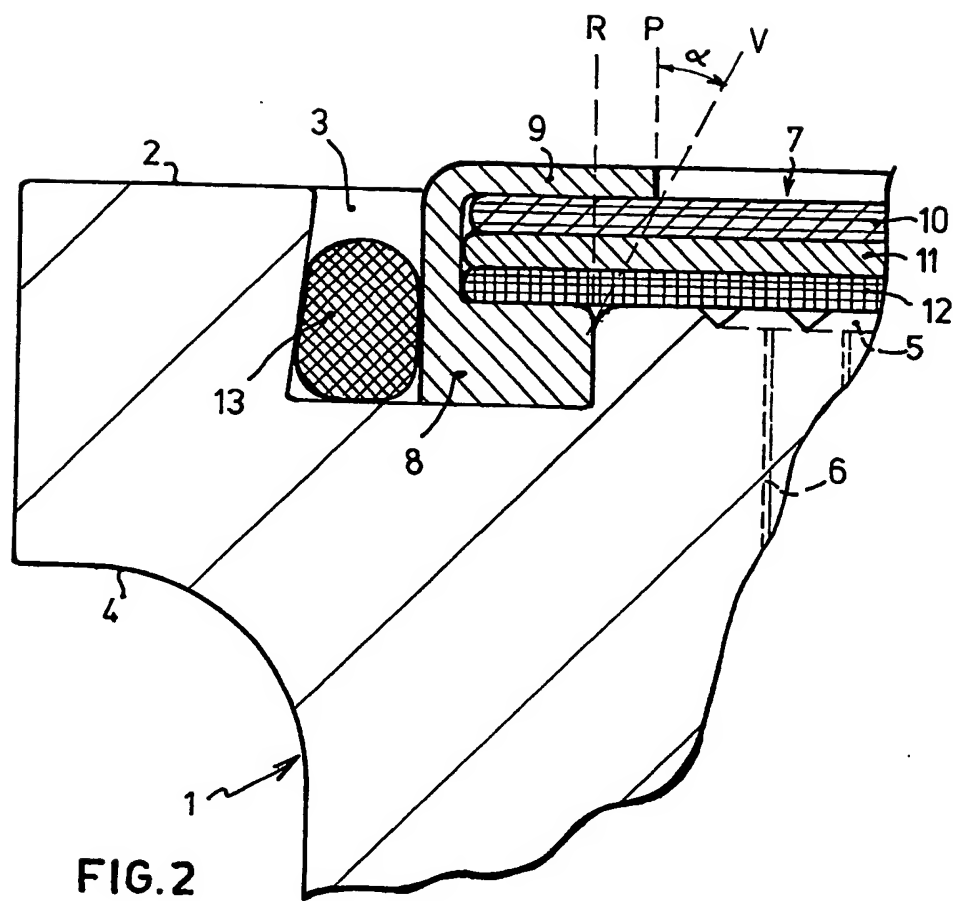


FIG. 1







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# EUROPEAN SEARCH REPORT

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EP 85 20 0999

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
A	DE-C- 672 944 (FIRMA J.M. LEHMANN) * Whole document *	1-3	B 30 B 9/04
A	--- NL-C- 41 552 (FIRMA J.M. LEHMANN) * Figures 1-3 *	1-3	
A	--- US-A-1 713 478 (M. MICHEL) * Whole document *	1-3	
A	--- DE-B-1 145 925 (J. WILLMES) * Column 3, lines 36-42; column 4, lines 5-21; figures 2-4 *	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl. 4)
			B 01 D B 30 B A 23 G
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 03-10-1985	Examiner GOURIER P.A.
CATEGORY OF CITED DOCUMENTS			
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(56) References cited:  
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DE-C- 672 944  
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## Description

The present invention relates to a filter screen in which one or more layers of filtering material are framed in a metal ring.

A filter screen in itself is known from US—A—1 713 478. The known screen is assembled by placing the one or more layers of filtering material on the one flange of the ring forming the annular supporting surface, and then connecting those layers to the supporting surface by bolts. This bolt connections might yield if the layers of filtering material are not supported themselves. If those layers of filtering material are supported themselves as yet, the supporting surface will have to be provided with recesses to accomodate the bolts. The invention clearly obviates those drawbacks of the known filter screens.

Filter screens, particularly destined for use in a high pressure separating press, e.g. a cocoa press, consist of plates of twilled gauze, made from steel wire, preferably chromium-nickel steel wire. The mounting of these known gauze plates in the front-face of a press plate of a separating press requires craftsmanship, because the outer rim of the gauze plate is to be bent through 90° and thereupon to be fixed by pressing a fastening means, e.g. a cord in the circular recess with trapezoidal cross-section. It is unavoidable that the weft threads loosen, notably in the zone where the warp threads are in radial or virtually radial direction. This results in weak places of the gauze plates, where in spite of skilled and precise mounting not infrequently further damage, e.g. breakage of wires occurs. The warp threads of such gauze plates have a diameter between about 0.3 and 0.35 mm and the weft threads have a diameter of about 0.2 mm.

During the operation of the separating press such high pressures are used, however, that in the weak places of the gauze plates breakage or further breakage of wires may occur. If this happens in the case of a cocoa press or other press for fatty food or feed material this may give rise to pieces of wires getting into the press cake, resulting in damage to mills or customer's complaints.

The occurrence of broken wires, and also of excessive deformation, is checked by regular inspection of the gauze plates. Once a wire is broken somewhere along its length, the protruding end can become trapped in the press cake and consequently be broken off when the press cake is removed. As soon as this is found to occur the filter screen must be replaced. The time during which the filter screen serves is called the useful life.

It is also an object of the invention to reduce the above problems considerably and to provide a filter screen which has a considerably longer useful life than the known filter screen. Furthermore the filter screen must be applicable without expensive adaptation of existing separating presses.

According to one aspect of the invention this is

achieved in that the metal ring is provided with two flanges, the one flange thereof forming an annular supporting surface for the one or more layers of filtering material, whereas the inner diameter of the other flange is different from the inner diameter of the one flange.

According to a further aspect of the invention this is achieved in that the inner diameter of the other flange differs from the inner diameter of the one flange by a value of essentially half the difference between the diameter of the pitch circle of the outer groove and the inner diameter of the one flange.

Preferably the diameter of the other flange is smaller than the inner diameter of the one flange.

The filter screen can include one or more supporting screens with on top of them a woven gauze press mat, the lower surface of the lower supporting screen being at essentially half the total height of the thickness of the ring plus the flanges.

It has appeared from experiments that wire breakage no longer occurs, and that the useful life of the filter screens has become considerably longer on average. The only adaptation of existing cocoa presses required consists of the widening and deepening of the circular recess with trapezoidal cross-section.

The invention will be further explained below with the help of the drawings.

Figure 1 shows as an example a cross-section of a press platen of a cocoa press with a filter screen mounted in it,

Figure 2 is an enlarged sectional view of the left hand part of Figure 1, showing a first embodiment of the framing of a filter packet in the ring and the fastening of a complete filter screen on the press platen by means of an elastic cord,

Figure 3 is a view as in Figure 2, but showing a second embodiment, and

Figure 4 shows a third embodiment.

In the cross-section of a press platen 1 of a (not shown) cocoa press which is adapted to receive a filter screen 7 according to the invention, characters A, B and C are used to indicate the following diameters:

A=the inner diameter of another flange 9 of a metal ring 8;

B=the inner diameter of the one flange 17 of the ring 8, and

C=the pitch circle of the outer groove 5 of a press platen 1.

The press platen 1 shown in more detail in Figure 2 has a front-face 2 in which a circular recess 3 with trapezoidal cross-section has been made. A reversed curved surface 4 of the press platen 1 together with a packing consisting of a felt ring (not shown) is to provide the seal between the press chamber of the cocoa press and the atmosphere.

The press platen 1 has furthermore in a well-known fashion a number of circular grooves 5 with e.g. a triangular cross-section, each of which is connected with a number of bores 6. The grooves 5 and the bores 6 are a part of the route

which the cocoa butter follows in a cocoa press. The so-called cocoa cake then remains above the front face 2, partially in the recess 3 and against a filter screen 7.

The filter screen 7 consists of a metal ring 8 with a one flange 17 forming an annular supporting surface for layer 12, and another flange 9, in which is framed a filter packet, consisting from top to bottom in Figure 2 of a woven gauze press mat 10, a first supporting screen 11 with a larger size of mesh than the press mat, e.g. about 0.75 mm, and a second supporting screen 12 with a still larger size of mesh, e.g. about 1 mm. As a matter of fact one of the supporting screens or both may be (a) perforated-plate screen(s).

The other flange 9 protrudes from the ring 8 in an axial direction before the filter packet is received in the ring.

The special feature of other flange 9 is that in the completed shape of the filter screen, it has an inner diameter A which differs from the inner diameter B of the one flange 17, and that it is preferably smaller. It is presumed that the longer useful life of the filter screen of the invention is, among other things, achieved by the favourable distribution and transmission of forces, as a result of the fact that the projection P of the inner diameter A of the flange 9 specifically does not coincide with the parallel tangents R between the curvatures of the ring 8 and the press platen 1.

Further, for cocoa and similar presses the locking of the ring 8 in the recess 3 is of importance. This can be achieved by means of a cord 13 made of Teflon or similar elastic material.

In an attempt to explain the considerably longer useful life which is provided by the invention one could suppose that the cord 13 exerts such a high strain in a radial inward direction on the ring 8 that the one flange 9 as it were tends to bend upward; or in any case to offer an increased resistance to the pressure in the press chamber of a cocoa press. Generally speaking that pressure in a cocoa press becomes so extreme, that only a few operations are sufficient for an originally almost-smooth press mat 10 to acquire a clear concentric pattern corresponding with the pattern of the grooves 5 in the press platen 1.

One could think of a lever effect which counteracts tilting in an inward direction, whereby the pressure of the inner edge of the other flange on the press mat is reduced.

The preference given in the invention in the case of a cocoa or similar press for the embodiment in which the inner diameter A of the other flange 9 is smaller than the inner diameter B of the one flange 17 of the ring 8 results from the fact, that in that embodiment little or no deformation of the press mat 10 occurs in the region of the projection of the parallel tangents R of the curvatures on the upper surface of the press mat 10. This prevails over the higher throughput of the embodiment in which the inner diameter A of the other flange 9 is larger than the inner diameter B of the ring 8.

It is also possible to describe the invention by

prescribing that the inner diameter A of the other flange 9 has to be outside the area of the angle  $\alpha$  defined by the fictitious connection lines V (Figure 2) between the upper touching point of the curvatures of the press platen 1 and the ring 8 on the one hand and the inner perimeter of the other flange 9 on the other with the axis of the filter screen, the angle  $\alpha$  being at least  $15^\circ$ .

Other embodiments than show in the drawing are also within the scope of the claims. Notably the variant shown in Figure 3 can be considered, in which a peripheral flange 14 extends outward below the cord 13. It is also possible to replace the cord 13 by a helically wound metal spring 15 which can be snapped into the circular recess 3 with trapezoidal cross-section. In the latter case the circumferential surface of the ring 8 is preferably provided with a notch 16 to position the spring.

#### Claims

1. Filter screen in which one or more layers (10, 11, 12) of filtering materials are framed in a metal ring (8) provided with two flanges (9, 17), the one flange (17) thereof forming an annular supporting surface for the one or more layers of filtering material, whereas the inner diameter (A) of the other flange (9) is different from the inner diameter (B) of the one flange (17).

2. Filter screen in which one or more layers (10, 11, 12) of filtering material are framed in a metal ring (8) provided with two flanges (9, 17), the one flange (17) thereof forming an annular supporting surface for the one or more layers of filtering material, in combination with a high pressure separating press, e.g., a cocoa press, in which the filter screen is placed in front of a press platen (1) with circular grooves (5), characterized in that the inner diameter (A) of the other flange (9) differs from the inner diameter (B) of the one flange (17) by a value essentially half the difference between the diameter of the pitch circle (C) of the outer groove (5) and the inner diameter of the one flange (17).

3. Filter screen as in Claim 1 or 2, characterized in that in the filter screen two supporting screens (11, 12) are included, with on top of them a woven gauze press mat (10), the lower surface of the lower supporting screen (12) being at essentially half the total height of the thickness of the ring (8) plus the flanges (9, 17).

4. Filter screen as in Claim 3, characterized in that a fictitious connecting line (V) between the upper touching point of the curvatures of the press platen (1) and the ring (8) on the one hand and the inner perimeter of the other flange (9) on the other hand forms an angle ( $\alpha$ ) of at least  $15^\circ$  with the axis of the filter screen.

5. Filter screen as in any one of the Claims 1—4, characterized in that the ring (8) is provided with a peripheral flange (14), extending in outward direction and situated in the mounted state of the filter screen below a fastening means (13).

## Patentansprüche

1. Filtersieb, worin eine oder mehrere Schichten (10, 11, 12) aus Filtermaterial in einem mit zwei Flanschen (9, 17) versehenen Metallring (8) eingehrahmt sind, wobei ein (17) dieser Flanschen eine ringförmige Tragfläche für eine oder mehrere Schichten aus Filtermaterial bildet, indessen der Innendurchmesser (A) des anderen Flansches (9) von dem Innendurchmesser (B) des einen Flansches (17) verschieden ist.

2. Filtersieb, worin eine oder mehrere Schichten (10, 11, 12) aus Filtermaterial in einem mit zwei Flanschen (9, 17) versehenen Metallring eingehrahmt sind, wobei ein (17) dieser Flanschen eine ringförmige Tragfläche für eine oder mehrere Schichten aus Filtermaterial bildet, im Zusammenhang mit einer Hochdrucktrennungspresse, zum Beispiel einer Kakaopresse, in der der Filtersieb vor einem Pressrahmen mit Ringnuten (5) vorgesehen ist, dadurch gekennzeichnet, dass der Innendurchmesser (A) des anderen Flansches (9) von dem Innendurchmesser (B) des einen Flansches (17) im Werte von hauptsächlich der Hälfte des Unterschieds zwischen dem Durchmesser des Stichtkreises (C) der Aussennut (5) und dem Innendurchmesser des einen Flansches (17) verschieden ist.

3. Filtersieb nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass in dem Filtersieb zwei Trag gaze (11, 12) mit obenauf einer Pressmatte (10) aus einer Gewebelage vorgesehen sind, wobei die Unterfläche der unteren Traggaze (12) im wesentlichen auf der Hälfte der Gesamthöhe der Dicke des Rings (8) zuzüglich der Flanschen (9, 17) liegt.

4. Filtersieb nach Anspruch 3, dadurch gekennzeichnet, dass eine imaginäre Verbindungslinie (V) zwischen dem oberen Berührungspunkt der Abrundungen des Pressrahmens (1) und des Rings (8) einerseits und dem Innenperimeter des anderen Flansches (9) andererseits einen Winkel  $\alpha$  von wenigstens  $15^\circ$  mit der Herzlinie des Filtersiebs bildet.

5. Filtersieb nach irgendeinem der vorhergehenden Ansprüche 1—4, dadurch gekennzeichnet, dass der Ring (8) mit einem sich auswärts erstreckenden Umfangsflansch (14), der in der zusammengesetzten Stellung des Filtersiebs unter einem Befestigungsmittel (13) liegt, versehen ist.

## Revendications

1. Tamis pour filtre dans lequel une ou plusieurs couches (10, 11, 12) de matériau filtrant sont enfermées dans une bague métallique (8) comportant deux rebords (9, 17), l'un des rebords (17) formant une surface annulaire de support pour la ou les couches de matériau filtrant, alors que le diamètre intérieur (A) de l'autre rebord (9) est différent du diamètre intérieur (B) du premier rebord (17).

2. Tamis pour filtre dans lequel une ou plusieurs couches (10, 11, 12) de matériau filtrant sont enfermées dans une bague métallique (8) comportant deux rebords (9, 17), le premier rebord (17) formant une surface annulaire de support pour la ou les couches de matériau filtrant, en combinaison avec une presse pour l'extraction à haute pression, par exemple une presse de cacao, dans laquelle le tamis pour filtre est placé à l'avant du plateau (1) de la presse avec des rainures circulaires (5), caractérisé en ce que le diamètre intérieur (A) de l'autre rebord (9) est différent du diamètre intérieur (B) du premier rebord (17) suivant une valeur égale essentiellement à la moitié de la différence entre le diamètre du cercle primitif (c) de l'autre rainure (5) et le diamètre intérieur du premier rebord (17).

3. Tamis pour filtre selon la revendication 1 ou 2, caractérisé en ce que dans le tamis pour filtre, deux tamis de support (11, 12) sont inclus, avec sur leur sommet, un matelas (10) de presse en tissu métallique, la surface inférieure du tamis inférieur de support (12) étant à une hauteur essentiellement égale à la moitié de la hauteur totale de l'épaisseur de la bague (8) plus les rebords (9, 17).

4. Tamis pour filtre selon la revendication 3, caractérisé en ce qu'une ligne de connexion imaginaire (V) entre le point de contact supérieur des courbures du plateau (1) de la presse et la bague (8) d'une part et le diamètre intérieur de l'autre rebord (9) d'autre part forme un angle ( $\alpha$ ) d'au moins  $15^\circ$  avec l'axe du tamis pour filtre.

5. Tamis pour filtre selon l'une quelconque des revendications 1 à 4, caractérisé en ce que la bague (8) comporte un rebord périphérique (14) s'étendant dans la direction de l'extérieur et situé à l'état monté du tamis pour filtre au-dessous d'un moyen d'assujettissement (13).

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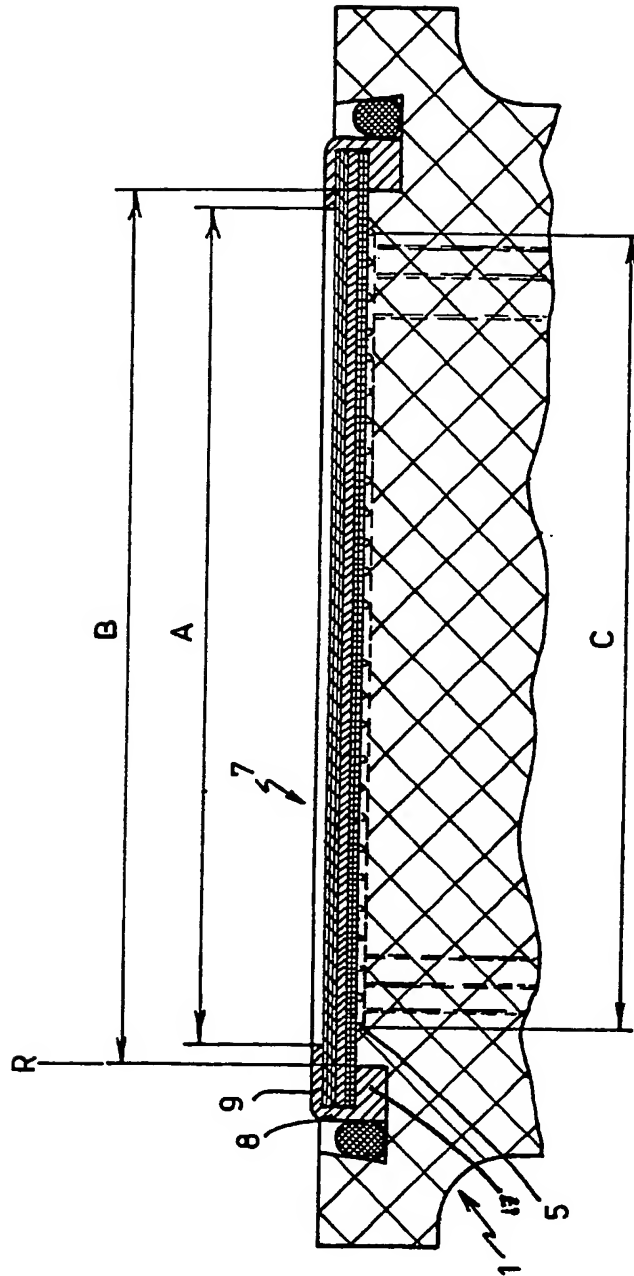


FIG. 1

